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Research Article

Teachers' understanding of gender responsive pedagogy and its application in teaching process: Case after teacher training program interventions in Rwanda

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Gender disparity in education begins in the early years of education with the ignorance of gender-responsive instructions. Despite progress being made toward gender parity, inequalities persist in boys' and girls' education, particularly in developing nations. Rwanda addressed this issue by integrating gender into its curriculum. However, the implementation requires teachers' proficiency in gender-sensitive instructions that prevent gender inequality in the teaching process. To enhance teachers' understanding and application of gender-sensitive instruction, the African Institute for Mathematical Science, through its Teacher Training Program [AIMS-TTP], supported by the Master Card Foundation, trained teachers on gender-responsive pedagogy. Therefore, this study examines trained teachers' understanding and implementation level of gender-responsive pedagogy in the teaching process after attending AIMS-TTP training. The study was conducted in 14 districts of Rwanda, and a web-based survey design was used to collect data from 351 teachers selected through purposive and random sampling. They completed a gender-responsive pedagogy questionnaire with a Cronbach alpha reliability of .71. Data were analyzed using Microsoft Excel 2016 for descriptive statistics and STATA v.18 for hypothesis testing. Results showed that both male and female teachers hold high levels of understanding and application of gender-responsive pedagogy, with over 80% agreement. No statistically significant difference in understanding and application of gender-responsive pedagogy was found between teachers based on gender, school location, school type, and teaching experience. Statistical comparison of teachers' agreement using the chi-square (χ^2) test showed a $p > .05$. The findings imply that training positively impacted teachers' understanding and application of gender-sensitive pedagogy. Therefore, we recommend expanding such training in other districts where interventions were not implemented.

Keywords: Gender, Gender-responsive; Pedagogy; Teachers; Teacher training program; Understanding

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1. Introduction

Women participation in mathematics and science education is a significant concern in many regions of the world. Adopting gender-inclusiveness and sensitive teaching techniques in early

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teacher education and in-service teacher training is crucial to teacher development by alleviating gender disparity (Abrha et al., 2023; Núñez-Román et al., 2023). The gender disparity in education begins in the early years of education with the ignorance of gender-responsive instructions. Girls are frequently channeled into lower status" subjects and discouraged from speaking when boys consume a disproportionate amount of teachers' energy. Also, education materials frequently reinforce low expectations of women and girls, thus a scarcity of female students in disciplines like math and science (Chapin & Warne, 2020).

To integrate and treat both male and female learners equally in-class activities, mathematics, and science, teachers should know how to plan for both boys and females by creating a class environment with instructional methods and materials that support equal learning (Lee, 2021). These skills require teachers to be knowledgeable of gender-responsive pedagogy and be skilled in its application in the teaching process (DeJaeghere & Niger, 2013; Mhewa et al., 2020).

Gender-responsive pedagogy refers to teaching and learning practices that focus on the different learning needs of male and female students. It does not merely focus on addressing women's and girls' needs but also is about being conscious of the intersection between gender and learners' needs to rectify the imbalances in society (Chapin & Warne, 2020). Gender-responsive pedagogy brings in gender-sensitive teaching that focuses on what is taught, how it is delivered, and how it is retained in both male and female learners (Thege et al., 2020).

Even though advancements are being made toward gender parity, gender inequality persists in the education of boys and girls, mainly in developing countries (Adeyemi & Akhigbe, 2020). For instance, Timothy (2022) noticed that there is no gender equality in Nigeria. Besides, Abraha et al. (2021) noted that in Ethiopia, science teaching and learning activities have been challenged by gender inequality. In developing countries, gender-blind teaching approaches foster gender inequities in the classroom, giving rise to a teaching and learning environment where male students are allowed to dominate debates and classroom space (Chapin & Warne, 2020).

Gender equality in math and science education can be achieved by incorporating gender mechanisms into the pedagogical delivery of mathematics and science instruction. One of the strategies to alleviate gender disparities in mathematics and science education is the adoption of gender-responsive pedagogy [GRP], which ensures that boys and girls are equally treated and involved in classroom activities (Dorji, 2020). The major obstacle facing today's teachers is the lack of gender pedagogical skills for instruction (FAWETZ, 2021). Besides, the literature shows that teachers have a limited understanding of gender-responsive pedagogy (Mhewa et al., 2020). For instance, it is reported that science teachers are ineffective in incorporating gender context in lesson planning, preparation, and teaching materials. Besides, they lack gender-responsive sexual maturation management skills (Abraha et al., 2021).

Similarly, years ago, gender inequality was reported in the Rwandan context of education, where males and females were used to not being taken equally while learning, leading to boys outperforming girls (Nader, 2016). Poor understanding of the gender equality concept, including gender sensitivity and resistance to behavior change in parents and teachers, was the most to foster gender disparity in the Rwandan education system (Nader, 2016). To alleviate gender disparity in education, Rwanda has settled different gender policies, including the "Girls' Education Policy 2008," aiming to eliminate gender disparities and inequality in education and training as well as in management structures (Gender Monitoring Office [GMO], 2021). To achieve this policy goal, Rwanda has considered gender issues in the new curriculum, which is "a competence-based curriculum [CBC]" that integrates gender in lesson planning and in the teaching and learning process as a cross-cutting issue (Rwanda Educational Board, 2015).

Implementing a CBC in 2016 required teachers to be knowledgeable not only on math and science content and hands-on activities for teaching but also gender-responsive pedagogy, gender-sensitive methods, and inclusive to equally focus on the specific needs of both males and females in classroom activities. To implement inclusiveness and gender-responsive learning environments, teachers must be well-skilled in approaches preventing gender bias and gender-based

discrimination in their classrooms, and they need to be supported in utilizing a variety of approaches and strategies that positively and effectively engage all students in lessons (Uworwabayeho et al., 2017). These skills were supposed to be transferred to in-service teachers through training for continuous professional development (UNICEF Rwanda, 2017).

With these imperative needs, Rwanda planned and trained all teachers all over the country; however, it could not achieve easily and directly to all teachers alone. Due to this, the Rwandan Education Board [REB] worked closer with different Non-Governmental Organizations [NGOs], supporting education to train teachers. With this regard, the African Institute for Mathematical Science, through its teacher training program [AIMS-TTP], had willingness to increase teachers' capacity for CBC implementation through training sessions and embedded in its objectives one to increase teachers' understanding of gender equality, inclusion, and application skills of gender-sensitive teaching methods.

To achieve the goal, AIMS-TTP, in partnership with the Rwanda Education Board under financial support from the Master Card Foundation, trained secondary school mathematics and science teachers from 14 districts of Rwanda on gender-responsive pedagogy to enhance their understanding and application of gender-sensitive instructions. Therefore, the present study aims to explore the understanding and application level of gender responsive pedagogy in trained mathematics and science after attending a series of trainings. The study was grounded on the following objectives.

O1) To examine teachers' understanding and application of gender-responsive pedagogy after attending AIMS-teacher training program interventions in 14 districts of Rwanda.

O2) To test whether there is a statistically significant difference between males' and females' understanding and application of gender-responsive pedagogy after AIMSTTP interventions

O3) To test whether there is a significant difference in understanding and application of gender-responsive pedagogy between teachers teaching in rural and urban schools, between teachers from Boarding and day schools, and between teachers with different years of teaching experience after AIMS-TTP interventions

Objectives two and three resulted in the following null hypothesis:

H1: There is no statistical significance difference between males' and females' understanding and application of gender-responsive pedagogy after AIMS-TTP interventions

H2: There is no statistically significant difference in the understanding and application of gender-responsive pedagogy between teachers teaching in rural and urban schools after AIMS-TTP interventions

H3: There is no statistically significant difference in understanding and application of gender-responsive pedagogy between teachers from boarding and day schools after AIMS-TTP interventions

H4: There is no statistically significant difference in understanding and application of gender-responsive pedagogy between teachers with different years of teaching experience.

2. Method

2.1. Research Design

The study employed a web-based survey design. Survey research is a standard design in education, and it is useful to describe the population's attitudes, beliefs, habits, and opinions or characteristics (Creswell, 2015). Due to dynamic technology, researchers may now use web-based tools and services to get survey data from their large population as technology has made conducting online surveys easier than ever (Fraenkel et al., 2012). The web survey was opted by this study to ease the collection of data from a more dispersed population of mathematics and science teachers from 14 selected districts of Rwanda.

2.2. Participants and Sampling Techniques

Eight thousand (8000) mathematics and science teachers teaching from senior one to senior three secondary schools named ordinally level (O-Level) in Rwanda, and those teaching from senior four to seniors six or advanced level (A-level) of secondary schools in 14 districts of Rwanda where AIMS-TTP implemented its activities were targeted in this study. Purposive sampling allowed their selection to focus on those from day and boarding schools that received training and facilities from AIMS-TTP. Random sampling was adopted to ensure a positive probability of each trained teacher being selected and participating among a population of eight thousand trained teachers. Based on Mcnaughton and Cowell (2018) sample size determination table, 367 number is the exact sample size of eight thousand population.

2.3. Instrument

Data were collected after AIMS teacher training program interventions on responsive pedagogy using a web-based survey questionnaire in April. The questionnaire comprises eight items on gender-responsive pedagogical content, see Appendix 1. It was developed by researchers and validated for content validity by experts in gender-responsive pedagogy at the University of Rwanda College of Education. Its reliability testing by statistical software for data science [STATA v.18] proved a Cronbach's alpha reliability of .71.

2.4. Data Collection Procedure

The data were collected in April 2023, and to be collected, the survey questionnaire was webbed using Microsoft Form, and an online link was generated.

Before administering the link to teachers, an online meeting was conducted to explain the purpose of the survey. Teachers were all ensured the privacy of their responses and that none will be mentioned in the results. Teachers were all explained that everyone is allowed and has an equal chance to respond to the survey. They were all given internet bundles to open and reply to the survey. After this introductory meeting, the link was distributed to teachers' WhatsApp groups and was active for one week. Every day, teachers were reminded about the survey and the expiration time of the link. after one week, the responses were downloaded in Microsoft Excel format; the participant count was 358, a number near the sample size estimate of eight thousand population according to Mcnaughton and Cowell (2018) sample size determination table.

2.5. Data Analysis

Data summary and visualization through graphs were done by Microsoft Excel 2016, while descriptive and inferential statistics were computed by the Statistical software for data science which is stand for Statistics and Data (STATA vs. 18.0). After being downloaded in Microsoft Excel format, data were cleaned by replacing scales with corresponding numbers as strongly disagree by" 1", disagree by "2", undecided by "3", agree by "4" and strongly agree by "5". During cleaning, we removed participant who had never answered to any statement among eight and 351 participants reached the analysis stage. Among 351 mathematics and science teachers, 112 were female, while 234 were male teachers. Based on their school's location, 287 teach in rural while 64 teach in urban schools. Considering their teaching experience, 119 hold 0 to 5 years of teaching experience, while 93 have 6 to 10 years, and 139 have above ten years of teaching experience.

To visualize the data, the "COUNT IF" function was used to count the number of responses per each statement through five scales. Thus, for each statement, the frequency and percentages of those who strongly disagreed, disagreed, undecided, agreed, and strongly agreed were computed. This also was done to compare the understanding and application of gender-responsive pedagogy among teachers, condensing their gender, school location, school category, and teaching experiences. Graphs and tables were plotted to display teachers' agreement and disagreement levels on their understanding of gender-responsive pedagogy after attending AIMS-TTP training. The chi-square test by STATA vs. 18.0 was computed to test if there is a statistically significant

difference in understanding and application of gender-responsive pedagogy between teachers based on gender, school location, school type, and teaching experience. The test fitted to the data of this study, which were individual counts and categorical in scales.

3. Results

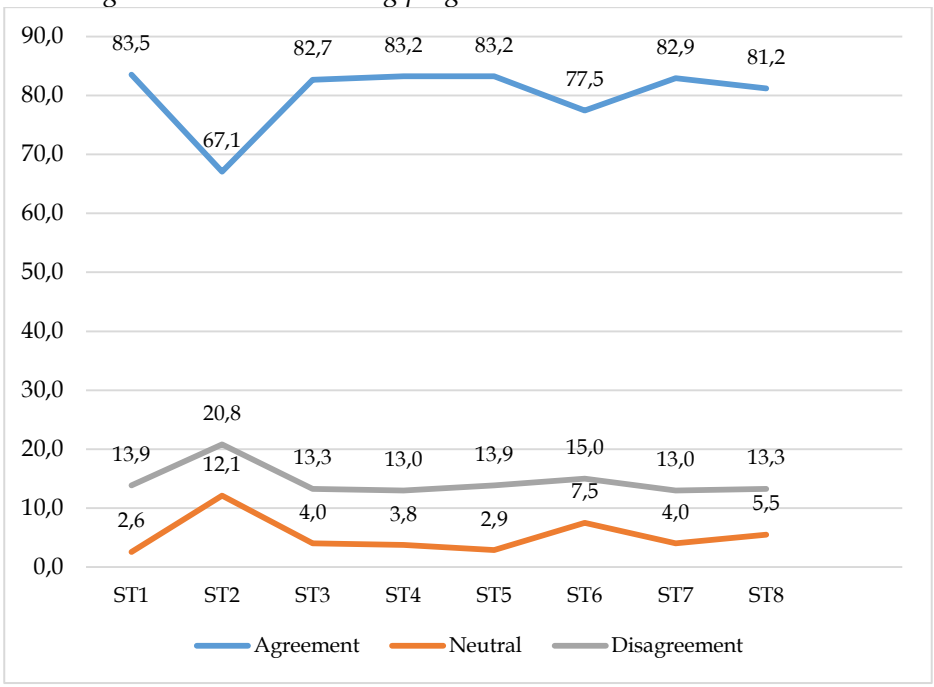
Figure 1 shows levels of mathematics and science teachers' understanding of gender-responsive pedagogy and its application in mathematics and science CBC. It illustrates an understanding and application level beyond 80% for all eight statements except for statement two, 67.1% [I address gender stereotypes], and statement six, 77.5% [I use gender-neutral (verbal and non-verbal) language in my class]. Eighty-three-point, five percent (83.5 %) of trained teachers, are now confident in designing learning activities that engage girls and boys in mathematics and science lessons, while 82.7 % agreed that they can make math and science lessons more inclusive. See statements 1 and 3

Mathematics and science teachers agreed at 83.2% that they integrate gender approach in the teaching and learning process, and this was also confirmed by 83.2 % who attested that they understand and apply gender equity in the teaching process see statements 4 and 5.

Eight two point nine (82.9%) of trained teachers attested that they acknowledge the equal ability of boys and girls in achieving mathematics and science proficiency in their teaching practice. Additionally, 81.2% confirmed that they adapt teaching to meet the needs of each learner (See Statements 7 and 8 in Figure 1).

Figure 1

Mathematics and science teachers' understanding and application of gender-responsive pedagogy after attending AIMS-teacher training program interventions



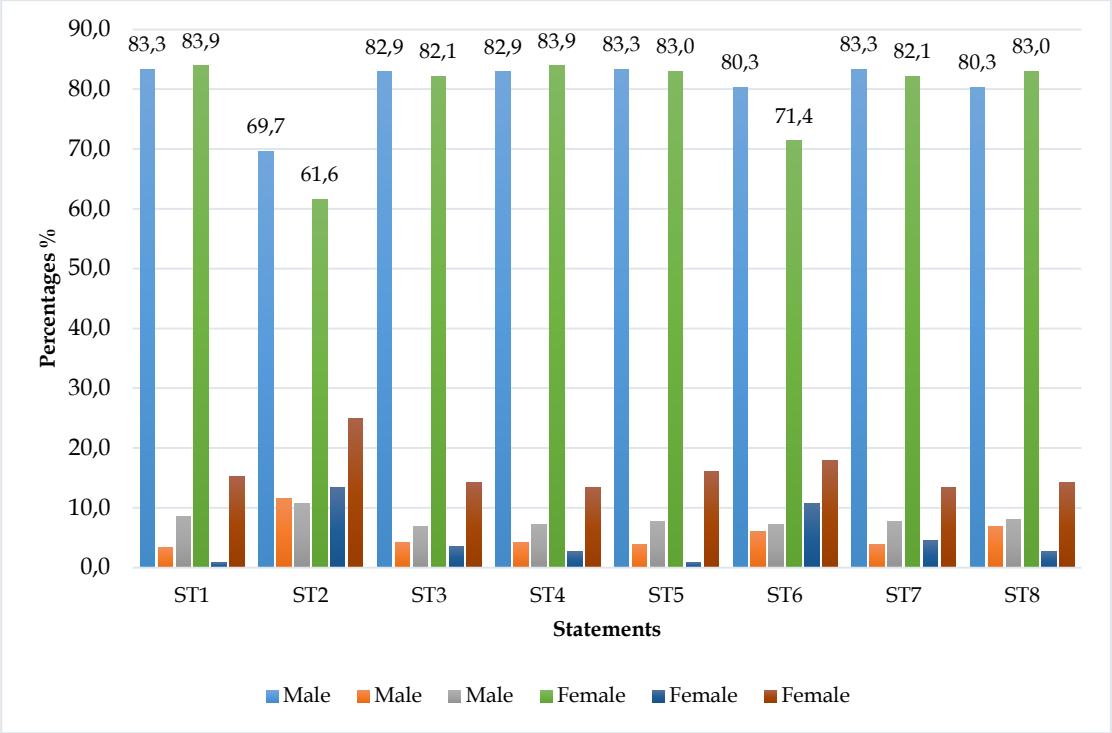
The mean estimation ($M = 80.25$) of teacher's confirmation of their understanding of gender-responsive pedagogy is higher than the mean of their disagreement ($M = 14.32$), which proves that Teachers achieved a high understanding of gender-responsive pedagogy and high application in the teaching and learning process of mathematics and science.

Figure 2 compares male and female teachers' understanding of gender-responsive- pedagogy. The agreement and disagreement level to confirm their understanding of gender-responsive-pedagogy and its application in the teaching process is different throughout the eight statements.

However, both females' agreement level is above 80% except for statements two and six, where their agreement is less than 80% see Figure 2.

Figure 2

Comparison of male and female understanding and application of gender-responsive pedagogy after AIMS TTP intervention



The mean estimation of both male and female confirmation to their understanding level of gender-responsive pedagogy is slightly different with male agreement mean of ($M = 80.72$) and ($M = 79.26$) for females. However, the difference is not statistically significant ($\chi^2(12) = 13.2500$, $p > .05$). Besides, their disagreement on the statement made no statistically significant difference ($\chi^2(36) = 42.0000$, $p > .05$). Therefore, the null hypothesis was accepted, stating that there is no statistically significant difference between males' and females' understanding and application of gender-responsive pedagogy after AIMS-TTP interventions.

The study checked the teachers' understanding and application level of gender-responsive pedagogy based on their school location. Figure 3 shows that teachers from urban schools confirmed their understanding and application level at a higher percentage than those teaching in rural schools. However, both showed their understanding level beyond 80% except for statement 2, where teachers from urban schools agreed at 70% while those from rural schools agreed at 67%. Besides, they agreed at 76% on statement six (see Figure 3).

There is a difference in the mean agreement on understanding and application of gender-responsive pedagogy between teachers from rural and urban schools. For instance, urban teachers' mean agreement is ($M = 87.5$) while the agreement means for teachers teaching in rural schools is ($M = 78.6$). Nevertheless, the difference is not statistically significant ($\chi^2(42) = 54.0000$, $p > .05$). This shows that after AIMS-TTP interventions, teachers from urban and rural schools hold the same understanding and application of gender-responsive pedagogy. Therefore, null hypothesis two, stating that "There is no statistically significant difference in the understanding of gender-responsive pedagogy between teachers teaching in rural and urban schools after AIMS-TTP interventions," was accepted.

Figure 3

Urban and Rural mathematics and science teachers' understanding and application of gender-responsive pedagogy after AIMS-TTP interventions

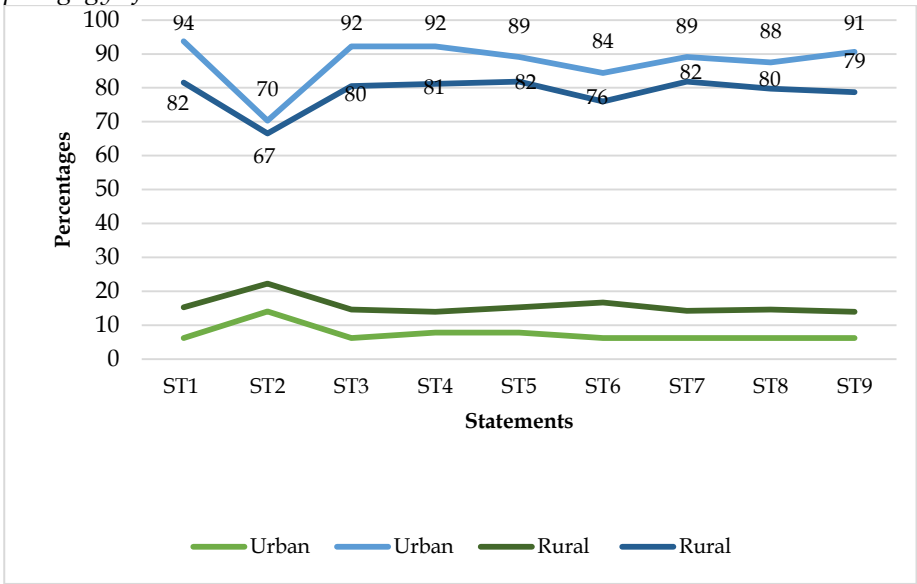
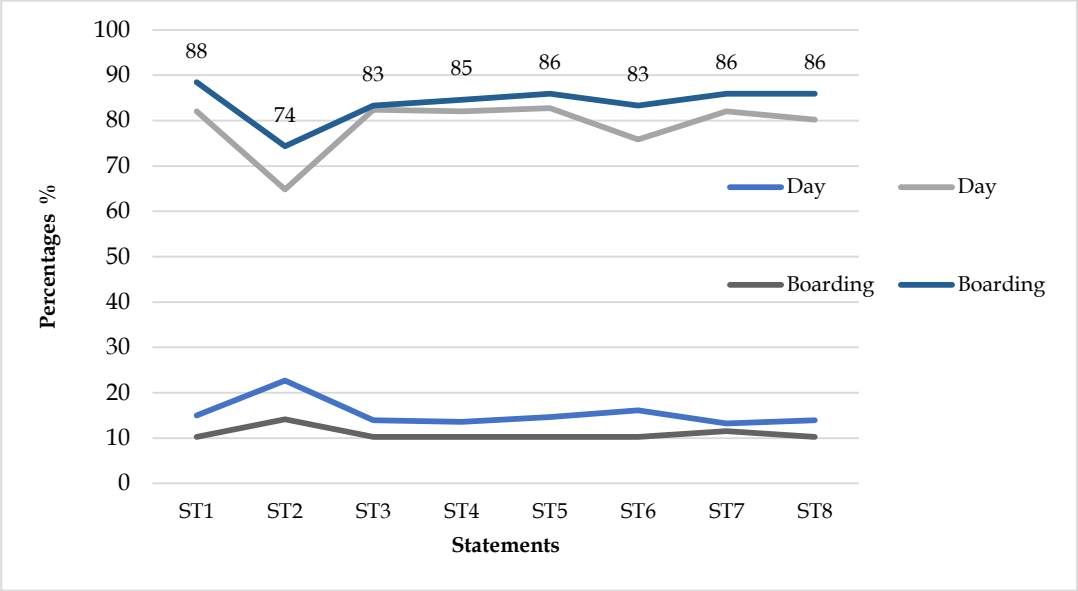


Figure 4 shows the understanding and application of gender-responsive pedagogy of teachers teaching in boarding and day schools. Based on percentages of agreement, boarding school teachers have a higher understanding and application of gender-responsive pedagogy than teachers in day schools. Both boarding and day school teachers' agreement on the statements is above 80% except for statement two, where they agreed at 74%. Day school's agreed on statement two is 65%, and 76% agreement on statement six.

Figure 4

Boarding and day school mathematics and science teachers' understanding of gender-responsive pedagogy after AIMS-TTP interventions



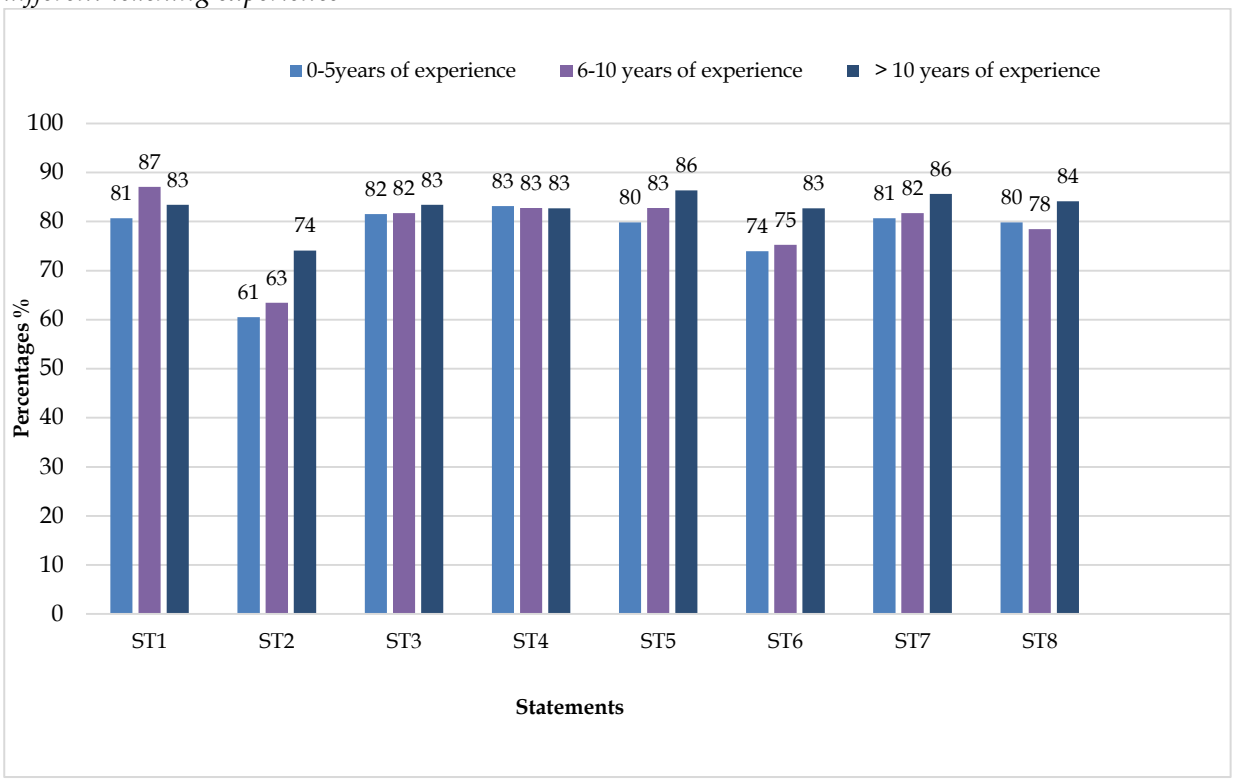
The difference in understanding and application of gender-responsive pedagogy was also realized between their agreement means, where boarding schools mean is ($M = 83.9$) and day school agreement means is ($M = 79.16$). Statistically, this difference between boarding and day school teachers' understanding and application of gender-responsive pedagogy is insignificant.

($\chi^2(20) = 19.0000$, $p > .05$). Therefore, hypothesis three, stating that "There is no statistically significant difference in understanding and application of gender-responsive pedagogy between teachers from boarding and day schools after AIMS-TTP interventions," was accepted.

Figure 5 visualize mathematics and science teachers' agreements on their understanding and application of gender-responsive pedagogy based on their teaching experience. Teachers in all categories of experience 0-5 years, 6-10 years, and above 10 years of teaching experience confirmed their understanding and application at 80 % and above on all statements except for statement two, where they all agreed at % less than 80% see statement 2 in Figure 5. On statement six, only teachers with more than 10 years of teaching experience agreed at above 80%.

Figure 5

Gender-responsive pedagogy understanding and application level of mathematics and science teachers with different teaching experience



Besides, there is a difference in the mean agreement of teachers based on their teaching experience, as expressed by the findings in Table 1.

Table1

Mean agreement of teachers with different teaching experience

Years of teaching experience	*Mean*	*SE*	*95% conf. interval*	
0-5-year agreement	77.40	2.30	72.09	82.72
6-10 agreement	79.69	2.31	74.36	85.02
>10 years agreement	82.81	1.17	80.11	85.52
0-5 disagreement	17.09	1.13	14.48	19.69
6-10years disagreement	14.22	1.29	11.24	17.19
>10year disagreement	11.91	0.55	10.64	13.18

However, there is no statistically significant difference in understanding and application of gender-responsive pedagogy neither between teachers with 0-5 years and 6-10 years of teaching experience ($\chi^2(36) = 40.5000$, $p > .05$), 0-5 years and above 10 years of teaching experience

($\chi^2(30) = 29.2500, p >. 05$) nor between teachers of 6-10 year and above 10 years of teaching experience ($\chi^2(30) = 32.2500, p >. 05$).

4. Discussion

Mathematics and science teachers showed a high understanding and application level of gender responsive pedagogy after attending AIMS-TTP training. This resulted from the training structure adopted. Teachers were given training on gender responsive pedagogy each year of project implementation except the year 2020 due to the COVID-19 pandemic, which means a one-week intensive training in 2018, 2019, 2021, and 2023. This training repetition helped them to fix what they did not understand in previous training. Besides training, discussions among themselves also enabled them to know what one did well or not in implementing gender approaches in teaching. Due to this, they used to learn from each other, thus improving their understanding and application of gender-responsive pedagogy in their everyday teaching process.

Eighty-three point five (83.5 %) of teachers are now confident in designing learning activities that engage girls and boys in mathematics and science lessons. This agreement tells that teachers are confidently able to plan classroom activities that equally give both boys and females equal chance of participation. This will lead to similar performance, thus developing a country society where both males and females are equally competent in the job market.

The findings contrast with what was found in Ethiopia, where teachers were found to be unable to create gender-responsive lesson plans and teaching materials (Abrha et al., 2023). This inability of teachers to apply gender responsive pedagogy explains the lack of its understanding in the country. This strengthens the importance of AIMS-TTP training on gender-responsive pedagogy and its use in Rwanda. Nevertheless, the study lines with Ananga (2021), who noticed that after attending Ghana's initial teacher training program, teachers increased their understanding of gender-responsive pedagogy in teachingEnglish Language, Mathematics, and Science. This implies that training improves teachers' understanding and skills to use pedagogy that focuses on the specific needs of both boys and females in classroom activities. Therefore, gender-responsive pedagogy training should be extended to all teachers in other districts of Rwanda that have not yet received AIMS-TTP interventions.

The fact that 82.7% of teachers understand and apply inclusiveness in their class education tells that during AIMS-TTP training, teachers acquired the relationship between gender-responsive teaching and inclusive education. In addition, the findings show that teachers strongly try to meet the diverse learning needs of all students without removing anyone from the classroom. This shows that AIMS-TTP training contributed to teachers' understanding of gender promotion through an inclusive classroom, which implies that after attending training, teachers in their professional teaching in 14 districts of Rwanda are aware of and able to create gender-inclusive learning environments. The findings agree with Gurung and Rajbanshi (2020), who also noted that teacher training programs are essential for transforming teachers' gender-biased perspectives through promoting their understanding of gender-inclusiveness. Besides, the findings line with a systematic review that shows that through increasing gender responsive pedagogy training, teachers become gender-inclusive implementers by focusing on girls' and boys' students' specific needs in an inclusive classroom (Guerrero & Guerrero Puerta, 2023).

The high understanding and application of gender equity (83.3%) in classroom activities resulted from the training content that included a concept of how to apply equity in teaching. Besides, it is rooted in the equity application when being trained. Meaning that they learned by seeing how they must equitably care for their learners to promote the equal learning and achievement of both boys and females. The finding tells that teachers can highly consider all students by providing them with needed support to make them achieve at the same level. The implication is that teachers implement a CBC by planning the learning activities in consideration of boys' and females' specific needs to promote equal learning.

The findings line with Bhattarai, (2021) who realized that teachers apply gender-responsive pedagogy through greater equality in the classroom. The findings of the research contradicted the reseavch of Timothy (2022), who noticed that teachers understanding and application of gender-responsive pedagogy is very low and that teachers need more training to promote a positive mindset on gender equity in teaching activities. This proves that Rwandan teachers who attended AIMS-TTP training interventions understand and apply gender-responsive pedagogy in teaching.

The male and female teachers' equal understanding and application of gender-responsive pedagogy after AIMS-TTP interventions result from the gender equality and equity approach applied during training. During training, equality was emphasized moreover, the specific need of every teacher was focused on. For instance, female teachers were facilitated to attend fully as their counterpart boys by focusing on the specific facilities they needed. Female mothers with newborns from four months to two years were supported to attend with their babies at the training center. They received additional support both in terms of living facilities and transport means to their babies and baby care. Pregnant women were cared more to feel a training center as a home environment.

The study findings contest with Abrha et al. (2023) affirmation that training increased equally male and female application of gender-responsive pedagogy. Besides, Chapin et al., (2020) reported that once equally trained, both male and female teachers address gender bias in their teaching environment. Therefore, training on gender-responsive pedagogy and its use should be encouraged as it contributes to learning achievement, hence promoting the sustainable development of a country. The findings imply that both male and female trained teachers hold and apply gender responsive pedagogy in classroom activities. Therefore, the null hypothesis stating that there is no statistically significant difference between males' and females' understanding and application of gender-responsive pedagogy after AIMS-TTP interventions was accepted

The equal understanding and application of gender-responsive pedagogy between teachers in rural and urban schools result in AIMS-TTP training being equally given to all rural and urban math and science teachers. They were not separated; instead, they were all trained together, given the same pedagogical content, and all training facilitations were equally provided. Besides being gender-responsive, training was also inclusive. This tells that in all schools in rural or urban areas in all 14 districts of Rwanda where AIMS-TTP implementation was done, trained mathematics and science teachers apply gender-responsive pedagogy. This implies the contribution of AIMS-TTP to girls' education policy implementation in Rwanda (Rwanda Ministry of Education, 2008) and to the competence-based curriculum implementation that integrates gender education as a cross-cutting issue (Rwanda Educational Board, 2015).

The difference in the mean agreement of teachers from boarding and day schools may resulted from the difference in participation number, where the number of teachers from day schools was higher than the number of teachers from boarding schools. The non-statistically significant difference in understanding and application of gender responsive pedagogy between these teachers implies that gender responsive pedagogy is being applied equally in math and science class activities in both boarding and day schools in 14 districts of Rwanda.

The findings showed that regardless of their teaching experience, teachers have gained a high understanding and application of gender-responsive pedagogy. This equal understanding roots from AIMS-TTP training ways used where both less experienced and highly experienced teachers were treated together and equally considered and facilitated in the training, thus equally gaining on gender-responsive pedagogy. The findings agree with (Abrha et al., 2023; Ananga, 2021), who perceived that teachers' teaching experience does not affect understanding and implementation of gender-responsive pedagogy. The implication is that all mathematics and science teachers in all 14 districts of Rwanda apply gender-responsive pedagogy regardless of their teaching experiences.

In general, teachers in all of their aspects of teaching categories responded at less than 80 % to statement two [I address gender stereotypes] see Figure 1 to 5. Gender stereotypes are

preconceived notions about what men and women should look like and be capable of doing. It involves assigning people certain qualities, traits, and roles based on their gender. For instance, males change diapers, women are lousy drivers, men are stronger, women are better cares, and females should be docile and permitted to cry, while boys are expected to be brave and not cry, females are better suited for nursing while boys are suited for Mathematics, etc. (Ministry of Gender and Family Promotion, 2021; Uworwabayeho et al., 2017).

That teachers showed a moderate level of addressing gender stereotypes in teaching mathematics and science does not mean that training skipped this gender concept; rather, it means the persistence of a social-cultural mindset in teachers who resist change. This shows that teachers still assign roles differently to boys and females in classroom activities. The roots cause may rely on different factors that, among others, include instructional materials like textbooks, web images, and charts, which may still portray male and female roles differently. The same existence of gender stereotypes was also recently realized in Rwandan upper primary education (Nizeyimana et al., 2022). Besides, some researchers discussed the role of media to fight gender stereotypes (e.g. Ouédraogo et al., 2019).

The findings imply that trained teachers still need more training focusing on gender stereotypes and how to alleviate them while teaching. With this imperative need, the findings alarm the education policymakers, implementors, and evaluators to focus on this matter by taking majors to limit and alleviate gender stereotypes in schools. Besides, the findings show the necessity of continuance and regular teacher training on gender-responsive pedagogy. Therefore AIMS-teachers training programs in Rwanda should be extended to reinforce teachers' pedagogical professional application.

5. Conclusion and Recommendation

The study examined mathematics and science teachers' understanding and application level of gender-responsive pedagogy after attending African Institutes for Mathematical Science Teacher Training Program interventions. It was conducted in 14 districts of Rwanda where the AIMS-TTP implemented its activities. A web survey design and survey questionnaire were used to collect data from mathematics and science teachers teaching in public schools, both in boarding and day schools. The study findings showed that after teachers' training program interventions, trained mathematics, and science teachers understand and apply gender-responsive pedagogy at a percentage level beyond 80%, with an average mean agreement of $M = 80.25$. Both male and female teachers expressed a high understanding and application level, and there was no statistically significant difference in understanding and application of gender-responsive pedagogy in the teaching and learning process.

The findings on teachers' understanding and application of gender-responsive pedagogy based on different aspects of teacher categories proved no statistically significant difference. For instance, inferential statistics by chi-square test attested no statistically significant difference between teachers based on their gender, school location, school type, and teaching experience. The findings implication is that AIMS-TTP training added to teachers' knowledge and application skills of gender-responsive pedagogy as the findings affirmed that after attending teacher training program interventions, all trained teachers in 14 districts of Rwanda hold a high understanding and application of gender-responsive pedagogy. Besides a high understanding of gender-responsive pedagogy, they become gender-sensitive teaching implementers. An overall recommendation is regular training on gender-responsive pedagogy and gender sensitivity to teachers and an extension of training to teachers in other districts who have not received AIMS-teachers training program interventions.

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Appendix 1. Questionnaire

Questionnaire of teachers' understanding of gender-responsive pedagogy and its application in the teaching process

This questionnaire contains two parts, A and B. Part A is about the general characteristics of respondents. Part B focuses on teachers' understanding of gender-responsive pedagogy and its application after attending training by AIMS-TTP.

PART A: Please place an X next to the appropriate response for each of the following:

1. Gender

_____Male

_____Female

2. Years of teaching experience:

_____0-5

_____6-10

_____ more than 10

3. School location:

_____Urban

_____Rural

4. Category of the school:

_____Day school

_____Boarding school

PART B

Please mark your answer sheets by marking how you feel about each statement by putting a tick (√) around the level of agreement, each item should have only one response.

1= (Strongly disagree); 2= (Disagree); 3= (No opinion); 4= (Agree); 5= (Strongly agree)

Statements	1	2	3	4	5
1) I am now confident in designing learning activities that engage girls and boys in Mathematics and science lessons					
2) I Understand gender stereotypes and address them in Mathematics and science instruction					
3) I make mathematics and science lessons more inclusive					
4) I understand gender equity and I use it in the classroom					
5. I always integrate gender approach in the teaching, and learning process (Lesson planning, classroom management, performance evaluation, and learning activities that equally interest and engage both girls and boys in mathematics and sciences)					
6. I understand and use gender-neutral (verbal and non-verbal) language in my class					
7. In my teaching practice, I acknowledge the equal ability of boys and girls in achieving mathematics and science proficiency					
8. I adapt teaching to meet the needs of each individual learner as all learners are different but have the capacity to achieve the learning outcomes					